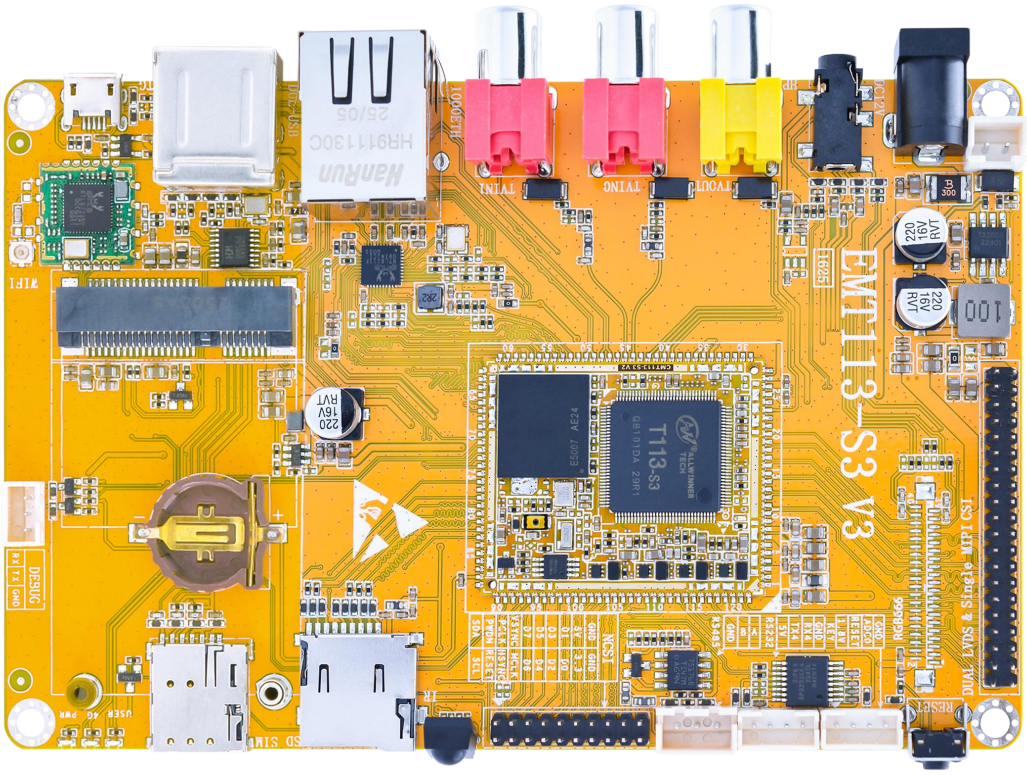
EMT113 Hardware Manual

V1.202512



Boardcon Embedded Design

www.boardcon.com

1.Introduction

1.1.About this Manual

This manual is intended to provide the user with an overview of the board and benefits, complete features specifications, and set up procedures. It contains important safety information as well.

1.2.Feedback and Update to this Manual

To help our customers make the most of our products, we are continually making additional and updated resources available on the Boardcon website(www.boardcon.com,www.armdesigner.com).

These include manuals,application notes, programming examples, and updated software and hardware. Check in periodically to see what's new!

When we are prioritizing work on these updated resources, feedback from customers is the number one influence, If you have questions, comments or concerns about your product or project, please no hesitate to contact us at support@armdesigner.com.

1.3.Limited Warranty

Boardcon warrants this product to be free of defects in material and workmanship for a period of one year from date of buy. During this warranty period Boardcon will repair or replace the defective unit in accordance with the following process:

A copy of the original invoice must be included when returning the defective unit to Boardcon. This limited warranty does not cover damages resulting from lighting or other power surges, misuse, abuse, abnormal conditions of operation,or attempts to alter or modify the function of the product.

This warranty is limited to the repair or replacement of the defective unit. In no event shall Boardcon be liable or responsible for any loss or damages, including but not limited to any lost profits,incidental or consequential damages, loss of business or anticipatory profits arising from the use or inability to use this product.

Repairs make after the expiration of the warranty period are subject to a repair charge and the cost of return shipping. Please contact Boardcon to arrange for any repair service and to obtain repair charge information.

Content

1 EMT113 Introduction

1.1 Summary

The EMT113 adopts Allwinner T113-S3/T113-S4, dual-core ARM Cortex-A7 SoC with 128MB/256MB DDR3 on-chip memory and HiFi4 DSP, 8GB eMMC flash. The processor supports full format decoding of H.265, H.264, MPEG-1/2/4, JPEG, and VC1, as well as encoding for JPEG or MJPEG. The EMT113 has various interfaces, supports gigabit Ethernet, WiFi, 4G LTE, USB, RS485, RS232, 2x TV-IN, DVP, TV-out and RGB/LVDS/MIPI DSI, providing users with efficient, stable, and reliable solutions in industrial control and HMI applications. Additionally, its H.265/H.264 1080P@60FPS video decoding and JPEG/MJPEG 1080P@60FPS video encoding capabilities enable to achieve high-quality video playback and image display in commercial display devices.

EMT113 is implemented with a CMT113 computer-on-module providing most of the functions and interfaces. The rich feature set of EMT113 is customizable according to the price/performance needs of the target application. EMT113 contains expansion connectors which accommodate a wide range of standard peripheral devices. Wide input range switched power supply is compatible with requirements for telecom and automotive applications. EMT113 is provided with full ready-to-run buildroot SW packages and comprehensive user manual and designing guide.

1.2 Allwinner T113-S3/T113-S4 Features

- **Microprocessor**

  -Dual-core ARM Cortex-A7.

  -32KB L1 I-cache + 32KB L1 D-cache per core, and 256KB L2 cache.

- **Memory Organization**

  -On-chip memory.

  128MB(T113-S3) or 256MB(T113-S4) DDR3

  8GB eMMC flash (up to 32GB)

  -External memory.

  SPI NOR Flash

  SPI NAND Flash

- **PWM**

  -Supports 8 independent PWM channels (PWM0 to PWM7).

-Support 8 channels capture input and continuous mode output.

- **Interrupt Controller**

-Supports 16 Software Generated Interrupts (SGIs), 16 Private Peripheral Interrupts (PPIs), and 192 Shared Peripheral Interrupts (SPIs).

-Support 16 software-triggered interrupts.

- **Power unit**

-Compatible with multiple mode power supply.

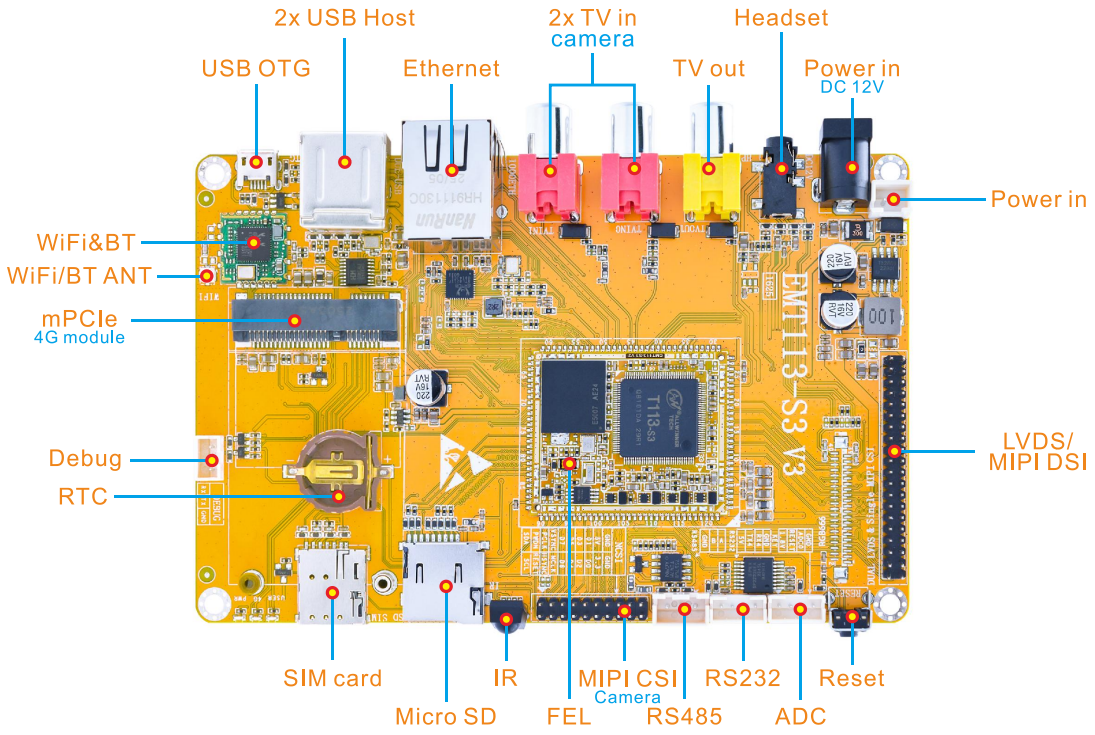
-Very low RTC consume current, less 7uA at 3V button Cell.

- **Temperature**

-Temperature accuracy: ±3°C from 0°C to +100°C, ±5°C from -25°C to +125°C.

-Supports over-temperature protection interrupt and over-temperature alarm interrupt.

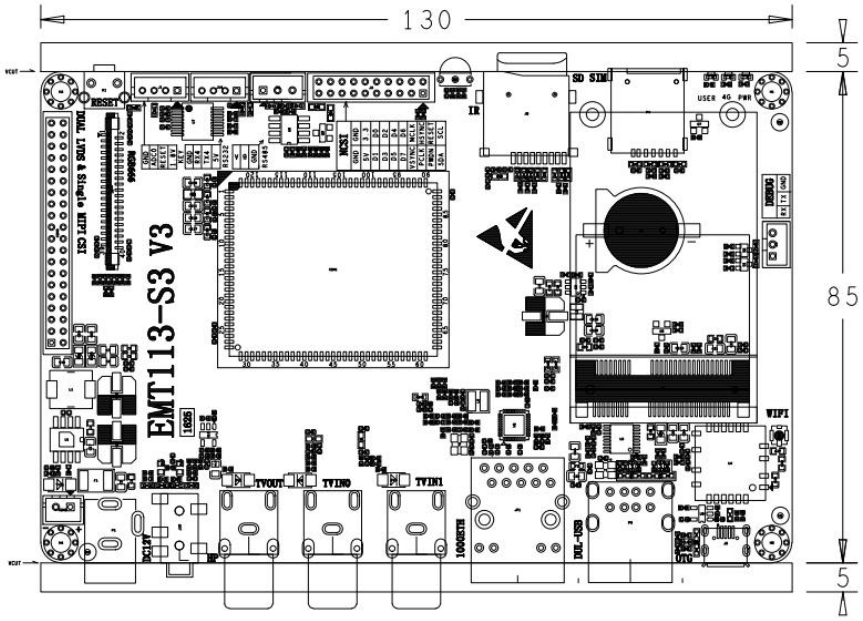
1.3 EMT113 Specifications



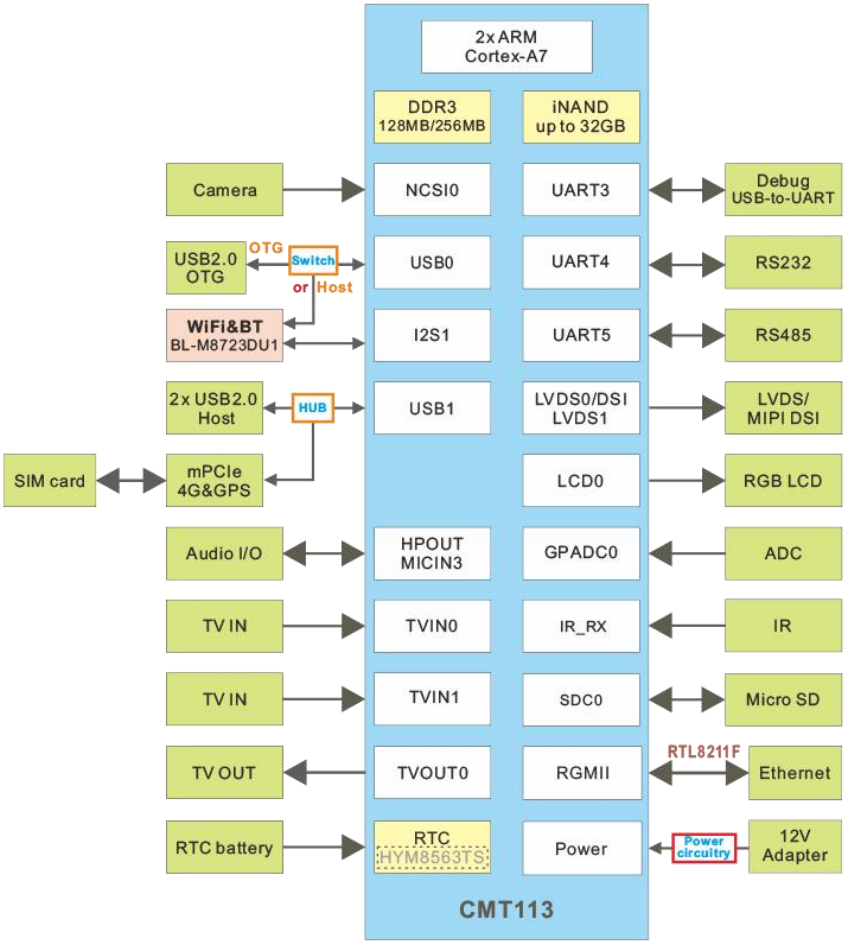
Feature	Specifications
CPU	Allwinner T113-S3/T113-S4. Dual-core ARM Cortex-A7 @ 1.2GHz

DSP	Single-core HiFi4
Memory	128MB(T113-S3) or 256MB(T113-S4) DDR3
Flash	8GB eMMC flash (up to 32GB)
Power	DC 12V/3A
USB	1x USB2.0 OTG, Micro USB 2x USB2.0 Host, Dual-USB AF
Ethernet	1x 10/100/1000 Mbps Ethernet RJ45 port via Realtek RTL8211F-CG controller
Display	RGB (multiplexed with LVDS1), 40-pin FPC connector MIPI DSI, 20-pin Header TV out, RCA connector
Video in	1x Parallel CSI, 20-pin header 2x TV in, RCA connector
Headset	3.5mm audio jack for Audio in/out
RTC	Real Time Clock, powered by external lithium battery
Serial Port	1x Debug (TTL), 3-pin connector 1x UART (RS232), 4-pin connector 1x RS485, 3-pin connector
mPCIe	4G model interface (EC25)
SD card	1x T-Flash card
SIM card	1x SIM card slot
Keys&Switch	Reset, FEL
IR	infrared receiver
WIFI&BT	RTL8723DU Module. 2.4G WiFi (802.11b/g/n) with Bluetooth 4.2
Dimension	130mm x 85mm

1.4 PCB Dimension



1.5 Block Diagram



1.6 CPU Introduction

The CPU module Allwinner T113-S3/T113-S4 is equipped with 128MB(T113-S3) or 256MB(T113-S4) DDR3 RAM and offers 8GB eMMC flash (up to 32GB) storage.

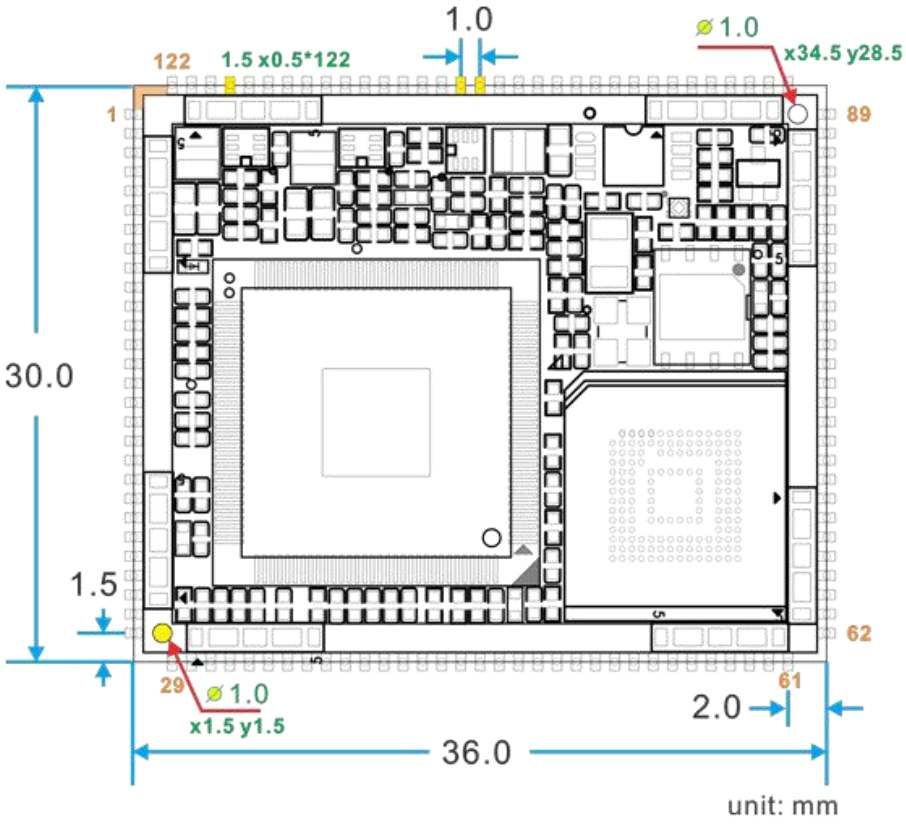
CM3588 specifications

Pin number–122 pins

Dimension–36mm x 30m

Power supply–DC 5V Battery

Application–Smart Commercial Displays, Industrial HMI, automotive dashboards, etc.



Pin Definition

Pin	Signal	Pin	Signal
1	VCC_SYS	62	PG6/UART1-TX
2	VCC_SYS	63	PG7/UART1-RX
3	VCC_SYS	64	PG8/UART1-RTS
4	PWEN	65	PG9/UART1-CTS
5	GND	66	PG10/PWM3

Pin	Signal	Pin	Signal
6	GND	67	PG11/I2S1-MCLK
7	SOC_3V3	68	GND
8	SOC_1V8	69	PB3/I2S2-DOUT1/TWI0-SCK/UART4-RX
9	GND	70	PB2/I2S2-DOUT2/TWI0-SDA/UART4-TX
10	PD10/LCD0-D14/LVDS1-V0P/SPI1-CS&DBI-CSX	71	PB6/I2S2-LRCK/TWI3-SCK/UART3-TX
11	PD11/LCD0-D15/LVDS1-V0N/SPI1-CLK&DBI-SCLK	72	PB7/I2S2-MCLK/TWI3-SDA/UART3-RX
12	PD12/LCD0-D18/LVDS1-V1P/SPI1-MOSI&DBI-SDO	73	PB5/I2S2-BCLK/PWM0/UART5-RX
13	PD13/LCD0-D19/LVDS1-V1N/SPI1-MISO&DBI-SDI&DBI-TE&DBI-DCX	74	PB4/I2S2-DOUT0/TWI1-SCK/UART5-TX
14	PD14/LCD0-D20/LVDS1-V2P/SPI1-HOLD&DBI-DCX&DBI-WRX	75	GND
15	PD15/LCD0-D21/LVDS1-V2N/SPI1-WP&DBI-TE	76	PF2/SDC0-CLK
16	PD16/LCD0-D22/LVDS1-CKP/DMIC-DATA3/PWM0	77	GND
17	PD17/LCD0-D23/LVDS1-CKN/DMIC-DATA2/PWM1	78	PF0/SDC0-D1
18	PD18/LCD0-CLK/LVDS1-V3P/DMIC-DATA1/PWM2	79	PF1/SDC0-D0
19	PD19/LCD0-DE/LVDS1-V3N/DMIC-DATA0/PWM3	80	PF3/SDC0-CMD
20	PD20/LCD0-HSYNC/TWI2-SCK/DMIC-CLK/PWM4	81	PF4/SDC0-D3
21	PD21/LCD0-VSYNC/TWI2-SDA/UART1-TX/PWM5	82	PF5/SDC0-D2
22	GND	83	PF6/IR-RX/PWM5
23	TVOUT0	84	GND
24	AVCC_1.8V	85	REFCLK-OUT
25	MICN3P	86	32.768KHz-OUT
26	MICN3N	87	GND
27	AGND	88	VBUCK

Pin	Signal	Pin	Signal
28	GND	89	GND
29	FMINR	90	GND
30	FMINL	91	RESET
31	LINEINR	92	GND
32	LINEINL	93	PE13/TWI2-SDA/PWM5
33	GND	94	PE12/TWI2-SCK/NCSI0-FIELD
34	HPOUTR	95	GND
35	HPOUTL	96	PE3/NCSI0-MCLK/UART2-RX
36	HPOUTFB	97	GND
37	GND	98	PE2/NCSI0-PCLK/UART2-TX
38	GPADC0	99	GND
39	TP-X1	100	PE11/NCSI0-D7/UART1-RX
40	TP-X2	101	PE10/NCSI0-D6/UART1-TX
41	TP-Y1	102	PE9/NCSI0-D5/UART1-CTS
42	TP-Y2	103	PE8/NCSI0-D4/UART1-RTS
43	GND	104	PE7/NCSI0-D3/UART5-RX
44	TVIN0	105	PE6/NCSI0-D2/UART5-TX
45	TVIN1	106	PE5/NCSI0-D1/UART4-RX
46	GND	107	PE4/NCSI0-D0/UART4-TX
47	USB1-DP	108	GND
48	USB1-DM	109	PE0/NCSI0-HSYNC/UART2-RTS
49	USB0-DP	110	PE1/NCSI0-VSYNC/UART2-CTS
50	USB0-DM	111	PD22/OWA-OUT/IR-RX/UART1-RX/PWM7
51	GND	112	GND
52	PG0/SDC1-CLK	113	PD0/LCD0-D2/LVDS0-V0P/DSI-D0P
53	PG1/SDC1-CMD	114	PD1/LCD0-D3/LVDS0-V0N/DSI-D0N
54	PG2/SDC1-D0	115	PD2/LCD0-D4/LVDS0-V1P/DSI-D1P

Pin	Signal	Pin	Signal
55	PG3/SDC1-D1	116	PD3/LCD0-D5/LVDS0-V1N/DSI-D1N
56	PG5/SDC1-D3	117	PD4/LCD0-D6/LVDS0-V2P/DSI-CKP
57	PG4/SDC1-D2	118	PD5/LCD0-D7/LVDS0-V2N/DSI-CKN
58	PG12/I2S1-LRCK	119	PD6/LCD0-D10/LVDS0-CKP/DSI-D2P
59	PG13/I2S1-BCLK	120	PD7/LCD0-D11/LVDS0-CKN/DSI-D2N
60	PG14/I2S1-DIN0	121	PD8/LCD0-D12/LVDS0-V3P/DSI-D3P
61	PG15/I2S1-DOUT0	122	PD9/LCD0-D13/LVDS0-V3N/DSI-D3N

2 Peripherals Introduction

2.1 DC-12V(P1)

The DC JACK is black enclosure full package, 3-pin plug Type 12V/3A DC adapter.

Pin	Signal	Description	Pin	Signal	Description
1	DCIN	Direct Current Input	2	GND	Ground
3	GND	Ground			

2.2 Audio I/O(J10)

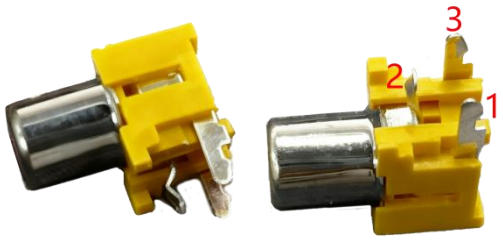
The EMT113 adopts audio codec ES8388, provides stereo audio output / input.

Feature

- Low power.
- IIS transfer audio data.
- Stereo output, support recording.

Pin	Signal	Description	Pin	Signal	Description
1	AGND	Analog Ground	2	HPOUTR	Right Channel Headphone Output
3	HPOUTL	Left Channel Headphone Output	4	HP_DET	Headphone Detection
5	HEARD_MIC	Headset Microphone Input			

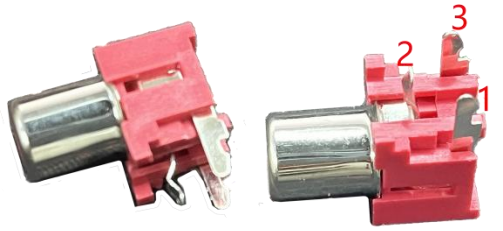
2.3 TV OUT(J11)



The EMT113 connector is a 3-pin type, supports up to 1080p@60fps output display.

Pin	Signal	Description	Pin	Signal	Description
1	TVOUT0	Video Output Channel 0	2	GND	Ground
3	NC	Not connect			

2.4 TV IN(J12, J13)

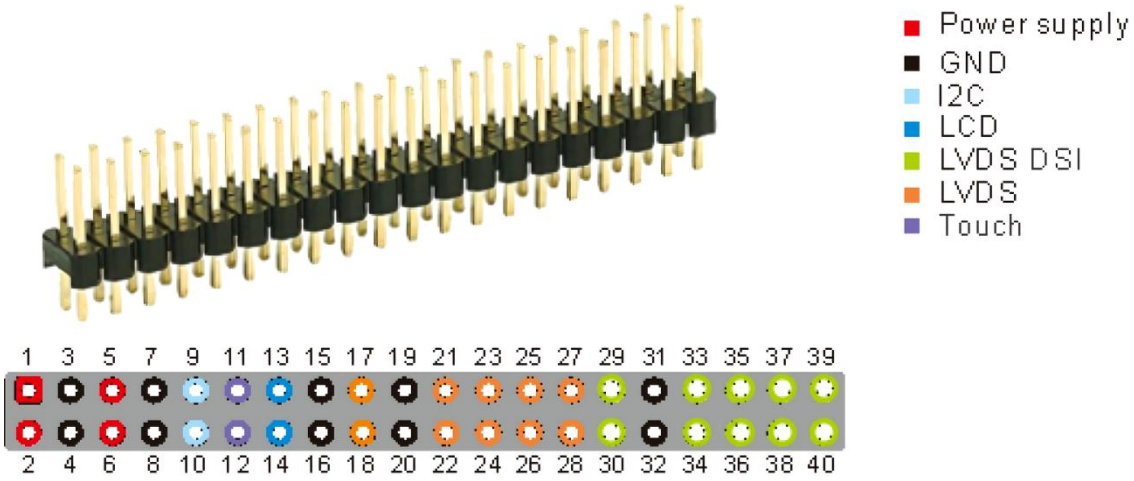


The EMT113 utilizes an RCA connector, can to connect an AV camera to the TVIN0 and TVIN1.

J12					
Pin	Signal	Description	Pin	Signal	Description
1	TVIN0	Video Input Channel 0	2	GND	Ground
3	NC	Not connect			

J13					
Pin	Signal	Description	Pin	Signal	Description
1	TVIN1	Video Input Channel 1	2	GND	Ground
3	NC	Not connect			

2.5 LVDS/MIPI DSI(CON3)

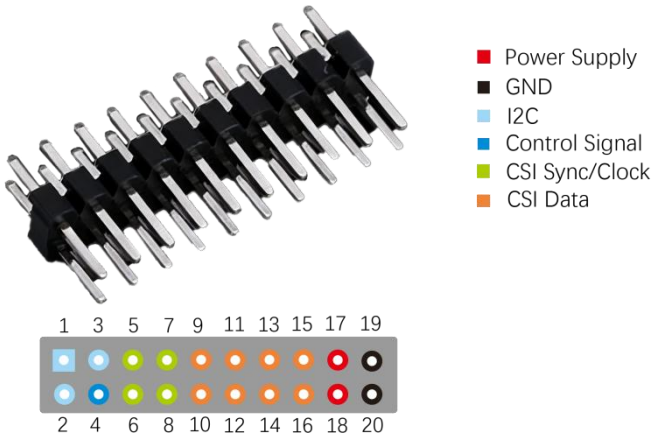


LVDS/MIPI DSI use 40-pin connectors, supports 10.1-inch HD capacitive LCD, up to 1280 x 800 @60fps resolution.

Pin	Signal	Description	Pin	Signal	Description
1	VIN_12V/VIN_5V	Input Voltage 12V/5V	2	VIN_12V/VIN_5V	Input Voltage 12V/5V
3	GND	Ground	4	GND	Ground
5	SOC_3V3	System on Chip 3.3V Power Supply	6	SOC_3V3	System on Chip 3.3V Power Supply
7	GND	Ground	8	GND	Ground
9	TOUCH_SCL	Touch Screen I2C Clock Line	10	TOUCH_SDA	Touch Screen I2C Data Line
11	TOUCH_RST	Touch Screen Reset	12	TOUCH_INT	Touch Screen Interrupt
13	LVDS_LCD_EN	LVDS LCD Enable	14	LVDS_PWM	LVDS PWM Control
15	GND	Ground	16	GND	Ground
17	LVDS1-CKP	LVDS1 Clock Positive	18	LVDS1-CKN	LVDS1 Clock Negative
19	GND	Ground	20	GND	Ground
21	LVDS1-V3P	LVDS1 Data Pair 3+	22	LVDS1-V3N	LVDS1 Data Pair 3-
23	LVDS1-V2P	LVDS1 Data Pair 2+	24	LVDS1-V2N	LVDS1 Data Pair 2-
25	LVDS1-V1P	LVDS1 Data Pair 1+	26	LVDS1-V1N	LVDS1 Data Pair 1-
27	LVDS1-V0P	LVDS1 Data Pair 0+	28	LVDS1-V0N	LVDS1 Data Pair 0-
29	LVDS0-CKP/DSI -D2P	LVDS0 Clock Positive or DSI	30	LVDS0-CKN/DSI -D2N	LVDS0 Clock Negative or DSI Data

		Data Pair 2+			Pair 2-
31	GND	Ground	32	GND	Ground
33	LVDS0-V3P/DSI-D3P	LVDS0 Data Pair 3+ or DSI Data Pair 3+	34	LVDS0-V3N/DSI-D3N	LVDS0 Data Pair 3- or DSI Data Pair 3-
35	LVDS0-V2P/DSI-CKP	LVDS0 Data Pair 2+ or DSI Clock Positive	36	LVDS0-V2N/DSI-CKN	LVDS0 Data Pair 2- or DSI Clock Negative
37	LVDS0-V1P/DSI-D1P	LVDS0 Data Pair 1+ or DSI Data Pair 1+	38	LVDS0-V1N/DSI-D1N	LVDS0 Data Pair 1- or DSI Data Pair 1-
39	LVDS0-V0P/DSI-D0P	LVDS0 Data Pair 0+ or DSI Data Pair 0+	40	LVDS0-V0N/DSI-D0N	LVDS0 Data Pair 0- or DSI Data Pair 0-

2.6 MIPI CSI (J3)



MIPI CSI use 20-pin connectors, supports 4-lane MIPI DSI up to 1280 x 800@60fps.

Pin	Signal	Description	Pin	Signal	Description
1	CSI-IIC-SDA	I2C Data Line for CSI	2	CSI-IIC-SCK	I2C Clock Line for CSI
3	CSI-PWDN	Power Down Control for CSI	4	CSI-RST	Reset Signal for CSI
5	NCSI0-PCLK	Pixel Clock for CSI0	6	NCSI0-HSYNC	Horizontal Sync for CSI0
7	NCSI0-VSYNC	Vertical Sync for CSI0	8	NCSI0-MCLK	Main Clock for CSI0
9	NCSI0-D7	Data Bit 7 for CSI0	10	NCSI0-D6	Data Bit 6 for CSI0
11	NCSI0-D5	Data Bit 5 for CSI0	12	NCSI0-D4	Data Bit 4 for CSI0
13	NCSI0-D3	Data Bit 3 for CSI0	14	NCSI0-D2	Data Bit 2 for CSI0
15	NCSI0-D1	Data Bit 1 for CSI0	16	NCSI0-D0	Data Bit 0 for CSI0

17	VDD_5V	5 Volt Power Supply	18	SOC_3V3	System on Chip 3.3V Power Supply
19	GND	Ground	20	GND	Ground

2.7 OTG Host(J5)

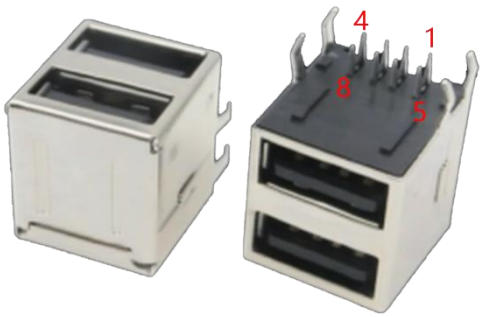
EMT113 OTG is a Micro USB2.0 port, it is used to download image and ADB transfer file.

Feature

- Compatible with USB OTG2.0 specification.
- Supports USB 2.0 High Speed (480Mbps), Full Speed (12Mbps) and Low Speed (1.5Mbps) operation in host mode.
- Hardware support for OTG signaling, session request protocol, and host negotiation protocol.

Pin	Signal	Description	Pin	Signal	Description
1	OTG_5V	5V power supply for OTG function	2	USB0-DM	USB 0 Data Minus (D-)
3	USB0-DP	USB 0 Data Plus (D+)	4	NC	Not Connect
5	GND	Ground			

2.8 USB 2.0 HOST(P3)



EMT113 provides dual-USB. It is used to connect USB mouse, U disk, USB camera, and other USB devices. Support hot-plug.

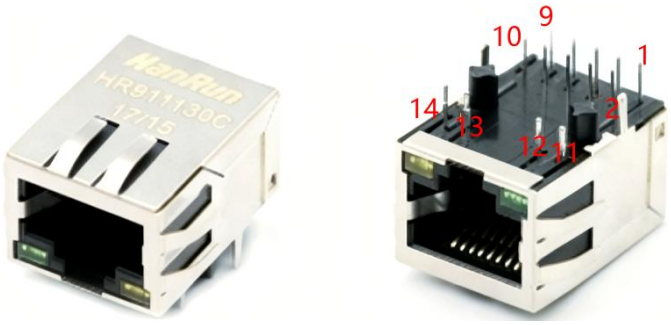
Feature

- Supports high-speed (480Mbps), full-speed (12Mbps) and low-speed (1.5Mbps) mode

- Supports automatic switching between bus- and self-powered modes
- Support periodic out channel in host mode

Pin	Signal	Description	Pin	Signal	Description
1	VDD_5V	5 Volt Power Supply	2	HUB-USB_DM4	USB Data Minus for Port 4
3	HUB-USB_DP4	USB Data Plus for Port 4	4	GND	Ground
5	VDD_5V	5 Volt Power Supply	6	HUB-USB_DM3	USB Data Minus for Port 3
7	HUB-USB_DP3	USB Data Plus for Port 3	8	GND	Ground

2.9 Ethernet(JP1)



EM3576 adopts RTL8211F as the Ethernet chip. RJ45 connector.

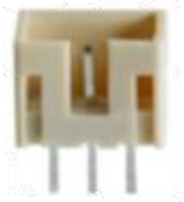
Feature

- Supports 10/100/1000-Mbps data transfer rates with the RGMII interfaces.
- Supports both full-duplex and half-duplex operation.
- Supports IEEE 802.3ab.

Pin	Signal	Description	Pin	Signal	Description
1	COM	Common	2	PHY0_MDI0+	Bi-directional transmit/receive pair 0
3	PHY0_MDI0-	Bi-directional transmit/receive pair 0	4	PHY0_MDI1+	Bi-directional transmit/receive pair 1
5	PHY0_MDI2+	Bi-directional transmit/receive pair2	6	PHY0_MDI2-	Bi-directional transmit/receive pair2
7	PHY0_MDI1-	Bi-directional transmit/receive pair 1	8	PHY0_MDI3+	Bi-directional transmit/receive pair 3
9	PHY0_MDI3-	Bi-directional transmit/receive pair 3	10	AGND	Ground

11	SOC_3V3	System on Chip 3.3V Power Supply	12	PHY0_LED2/ CFG_LDO1	PHY0 LED2 or Configuration LDO1
13	GND	Ground	14	PHY0_LED1/ CFG_LDO0	PHY0 LED1 or Configuration LDO0

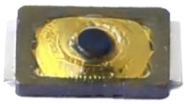
2.10 Debug(J4)



3-pin connector. The debug serial port baud rate is 1500000.

Pin	Signal	Description	Pin	Signal	Description
1	DEBUG_RX	Debug Receive Data	2	DEBUG_TX	Debug Transmit Data
3	GND	Ground			

2.11 User Buttons(K1, SW2)



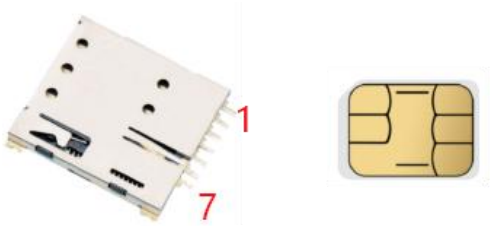
Key	Signal	Description	Key	Signal	Description
K1	Reset_KEY	Reset device	SW2	FEL	Full Erase/Lock (recovery mode)

2.12 4G Module(J7)

EMT113 adopts the standard PCI Express®MiniCard form factor (MiniPCIe) and provides global network coverage on the connectivity of LTE. It delivers 50Mbps-up and100Mbps-down data rates on LTE FDD networks and can also be fully backward compatible with existing UMTS and GSM/GPRS networks. The 4G model is EC20.

Pin	Signal	Description	Pin	Signal	Description
1	NC	Not connect	2	VCC3V3_MINIPCIE	3.3V MiniPCIe Supply
3	NC	Not connect	4	GND	Ground
5	NC	Not connect	6	NC	Not connect
7	NC	Not connect	8	SIM_VCC	SIM power
9	GND	Ground	10	SIM_DATA	SIM data
11	NC	Not connect	12	SIM_CLK	SIM Clock
13	NC	Not connect	14	SIM_RST	SIM Reset
15	GND	Ground	16	NC	Not connect
17	NC	Not connect	18	GND	Ground
19	NC	Not connect	20	VCC3V3_MINIPCIE	3.3V MiniPCIe Supply
21	GND	Ground	22	MINIPCIE20_PERSTn	MiniPCIe Reset
23	NC	Not connect	24	VCC3V3_MINIPCIE	3.3V MiniPCIe Supply
25	NC	Not connect	26	GND	Ground
27	GND	Ground	28	NC	Not connect
29	GND	Ground	30	NC	Not connect
31	NC	Not connect	32	NC	Not connect
33	NC	Not connect	34	GND	Ground
35	GND	Ground	36	MINIPCIE_USB_DM	MiniPCIe USB Data-
37	GND	Ground	38	MINIPCIE_USB_DP	MiniPCIe USB Data+
39	VCC3V3_MINIPCIE	3.3V MiniPCIe Supply	40	GND	Ground
41	VCC3V3_MINIPCIE	3.3V MiniPCIe Supply	42	LED_WWAN	LED
43	GND	Ground	44	NC	Not connect
45	NC	Not connect	46	NC	Not connect
47	NC	Not connect	48	NC	Not connect
49	NC	Not connect	50	GND	Ground
51	NC	Not connect	52	VCC3V3_MINIPCIE	3.3V MiniPCIe Supply

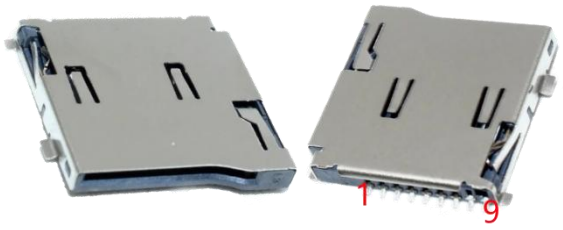
2.13 SIM(P4)



P4 is a pop-up SIM card slot which is compatible to the standard SIM Card and can be used for wireless transmission with a 3G/4G module.

Pin	Signal	Description	Pin	Signal	Description
1	SIM_CLK	SIM Card Clock	2	SIM_DATA	SIM Card Data
3	SIM_RST	SIM Card Reset	4	SIM_VCC	SIM Card Power Supply
5	SIM_VCC	SIM Card Power Supply	6	GND	Ground
7	NC	Not connect			

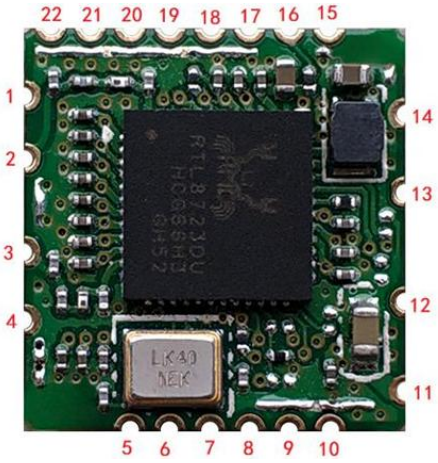
2.14 SD(J8)



The Micro SD card is used as an external storage device. The MMC controller interface supports up to 4-bit transfer modes. MMC is always accessible through the carrier board interface.

Pin	Signal	Description	Pin	Signal	Description
1	PF5/SDC0-D2	SD Card Data Line 2	2	PF4/SDC0-D3	SD Card Data Line 3
3	PF3/SDC0-CMD	SD Card Command Line	4	SD_3V3	SD Card 3.3V Power Supply
5	PF2/SDC0-CLK	SD Card Clock Line	6	GND	Ground
7	PF1/SDC0-D0	SD Card Data Line 0	8	PF0/SDC0-D1	SD Card Data Line 1
9	PF6/IR-RX/PWM5	IR Receiver/PWM Channel 5			

2.15 WiFi&Bluetooth(U4)



BL-M8723DU1 is a highly integrated single-chip 802.11n Wireless LAN (WLAN) USB2.0 Multi-Function network interface controller with integrated Bluetooth 2.1/4.2 controller. It combines a WLAN MAC, a 1T1R capable WLAN baseband, and RF in s single chip.

Features

- Operating Frequencies : 2.4~2.4835GHz
- IEEEStandards: IEEE 802.11b/g/n
- Wireless data rate can reach up to 150Mbps
- Bluetooth controller complies with Bluetooth core specification V4.2
- Connectto the external antenna through the half hole

Pin	Signal	Description	Pin	Signal	Description
1	GND	Ground	2	RF_S0	RF Switch 0
3	NC	Not Connect	4	GND	Ground
5	I2S1-DOUT0	I2S1 Data Output 0	6	I2S1-DIN0	I2S1 Data Input 0
7	I2S1-LRCK	I2S1 Left/Right Clock	8	I2S1-BCLK	I2S1 Bit Clock
9	NC	Not Connect	10	NC	Not Connect
11	VDD	Power Supply	12	HSDM	High-Speed Data-
13	HSDP	High-Speed Data+	14	GND	Ground
15	NC	Not Connect	16	NC	Not Connect
17	NC	Not Connect	18	NC	Not Connect
19	NC	Not Connect	20	NC	Not Connect
21	NC	Not Connect	22	NC	Not Connect

2.16 RTC(J2)

The backup battery(3V)is used to ensure the RTC (frequency 32.768KHz) is still able to work after power off.Lithium cell model: CR1220.

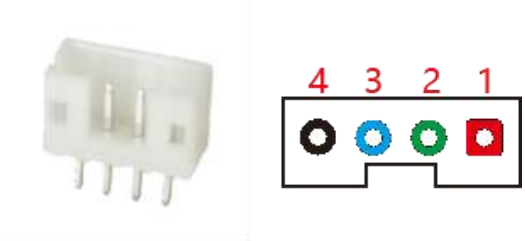
Pin	Signal	Description	Pin	Signal	Description
1	VBUCK	3V battery	2	GND	Ground

2.17 IR(IR1)

The IR is a side-mounted infrared receiver with 3-pin, mainly used for receiving infrared remote control signals.

Pin	Signal	Description	Pin	Signal	Description
1	IR-RX	Infrared Receiver Signal	2	GND	Ground
3	SOC_3V3	3.3V Power Supply for SoC			

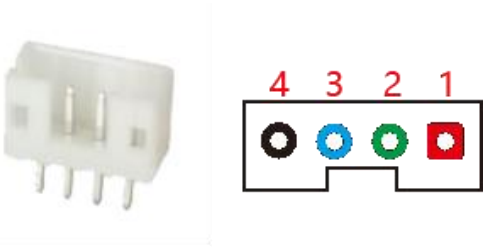
2.18 UART(J14)



The UART interface achieves serial communication via the RS232 standard.

Pin	Signal	Description	Pin	Signal	Description
1	VDD_5V	5V Power Supply	2	RS232_TX4	Serial Data Output
3	RS232_RX4	Serial Data Input	4	GND	Ground

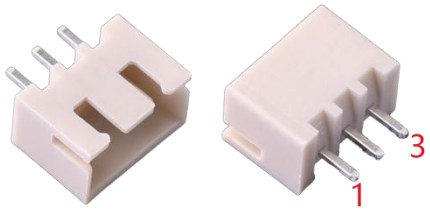
2.19 ADC(J1)



J1 is 4-pin connector. It is used to connect the ADC device.

Pin	Signal	Description	Pin	Signal	Description
1	SOC_1V8	1.8V Power Supply for SoC	2	RESET_KEY	Reset Key Input (Reset Signal)
3	GPADC0	General Purpose Analog-to-Digital Converter Input 0	4	GND	Ground

2.20 RS485(P5)



RS485 uses 3-pin connectors, using the SN75176B transceiver for bidirectional transmission and reception.

Pin	Signal	Description	Pin	Signal	Description
1	RS485_A	RS-485 signal line A	2	RS485_B	RS-485 signal line B
3	GND	Ground			

3 Product Configurations

3.1 Standard Contents

NO.	Item	Qty.(PCS)	Description
1	EMT113 board	1	Standard Content (128MB RAM, 8GB eMMC)
2	U-disk/CD-ROM	1	Buildroot SDK, Documents, tools, datasheets, etc.
3	Ethernet cable	1	1.5m Crossover cable
4	Serial Cable	1	CH9102X
5	USB Cable	1	USB OTG
6	Power adaptor	1	12V/3A DC
7	Antenna	1	WIFI&Bluetooth Antenna

3.2 Optional Parts

- LCD Module (10.1-inch MIPI panel, 10.1-inch LVDS panel)
- 4G Module